Yarrowia lipolytica: an industrial workhorse

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Yarrowia lipolytica is one of the most extensively studied ‘‘non-conventional’’ yeasts, being a strictly aerobic microorganism capable of producing important metabolites and having an intense secretory activity, which justifies efforts to use it in industry (as a biocatalyst), in molecular biology and in genetics studies. It is considered as nonpathogenic and several processes based on this organism were classified as GRAS by FDA, USA. This yeast is particularly adapted to hydrophobic substrates and in the last years it became a reference in research dealing with non-polar substrate metabolism. Many industrial applications of *Y. lipolytica* have been proposed, as shown by the many patents and papers mentioning it. One of the most important products secreted by this microorganism is lipase, which can be induced by many substrates, including olive mill wastewaters [1]. In fact, this yeast has been used for bioremediation applications due to its cell wall characteristics and surfactant production. In addition, *Y. lipolytica*, when grown under nutrient-limited conditions, is able to produce citric acid from a variety of carbon sources, including sugars, alkanes, plant oils, starch hydrolysates, ethanol, and raw glycerol (the main by-product of biodiesel production units). The production of aroma compounds from fatty acids though β-oxidation machinery of *Y. lipolytica* has been also extensively studied [2]. Moreover, this yeast as been described as oleaginous, with great potential to be used as single cell oils (SCO). Being strictly aerobic yeast, its growth and metabolite secretion are affected by the amount of oxygen available in the culture medium. Thus, studies of oxygen transfer mechanisms into such complex media systems composed of oil-in-water emulsions have gained great interest.

This work aims to throw light on how a single organism can be versatile with respect to its metabolic abilities, being exploited for a variety of purposes.

[1] Gonçalves, C., Lopes, M., Ferreira, J.P., Belo, I. (2009) Biological treatment of olive mill wastewater by non-conventional yeasts. Bioresource Technology 100(15), 3759-3763.

[2] Gomes, N., Teixeira, J.A, Belo, I. (2010) The use of methyl ricinoleate in lactones production by *Yarrowia lipolytica*: aspects of bioprocess operation that influence the overall performance. Biocatalysis and Biotransformation 28(4), 227–234.